RED CHARGER

FOR RED BRICK V-LOCK LITHIUM ION BATTERIES

OPERATING MANUAL

PLEASE READ THESE INSTRUCTIONS CONCERNING YOUR SAFETY

The RED CHARGER lithium-ion battery charger has been designed to manage relatively high currents in order to minimize charging time. The chargers will become warm during operation and it is therefore very important to keep their ventilation openings unobstructed.

Moreover, please follow the safety instructions below:

- Protect the equipment from humid environments. Avoid any contact with water or other fluids. Do not use if any liquid has been accidentally spilled inside the equipment. Contact qualified service personnel for inspection or repair.
- Clean only by using a dry cloth
- Unplug when not in use and avoid power surges
- Read the supplied instructions thoroughly and keep handy
- Avoid setting up near heat sources such as fire places, radiators, stoves or other heat generating equipment
- NEVER use without proper grounding
- Protect the AC mains power plug, connector and cord
- If the equipment develops a fault, have it repaired by qualified service personnel only
- NEVER block the ventilation openings or obstruct cooling fan airflow
- Use only as instructed by the manufacturer
- Do not remove cover or dismantle the apparatus. No user-serviceable parts inside

WARNING:

THIS EQUIPMENT MUST BE EARTHED. TO PREVENT FIRE OR SHOCK HAZARD DO NOT EXPOSE THE UNIT TO RAIN OR MOISTURE. TO AVOID ELECTRIC SHOCK, DO NOT OPEN THE APPARATUS AND ALWAYS REFER ANY SERVICING TO QUALIFIED PERSONNEL.

The user is being alerted of the importance of going through the literature accompanying this product and familiarizing himself with the important safety and operating instructions included.

RED CHARGER IS INTENDED FOR OPERATION WITH LINE VOLTAGES BETWEEN 100 AND 240V AC AND LINE FREQUENCIES BETWEEN 43Hz AND 60 Hz.

Note that this equipment is not supplied with an AC power cord.

PACKAGE CONTENTS:

- RED CHARGER* sequential dual position charger with Aux output
- Safety operating instructions
- 10 ft D.C power cable

INTRODUCTION

The RED CHARGER intelligent Lithium ion battery charger has been specifically designed for fast and reliable charging of RED BRICK V-lock batteries. The charger is capable of delivering 4.8 Amperes in constant current mode making them particularly suitable to users who require a fast turnaround from their batteries. External dimensions have been kept as compact as possible for maximum portability.

PROPERTIES

- Robust construction for studio and field use
- Sophisticated electronics for detecting the charging state
- Three-color LED indicator for individual charge-station monitoring
- Pre-charge function for protecting heavily discharged cells against high currents until their voltages rise to a safe level.
- Maximum compactness and space utilization

BATTERY CHARGING AND PERFORMANCE FEATURES

Initially, the charger will only apply a pre-charge current of a few milli-amperes to batteries that are heavily discharged. Once the cells inside the batteries reach a safe level, the full (maximum) charging current is delivered until the battery reaches almost 80% state of charge. After this, a constant voltage phase begins with the charging current decaying slowly until cut-off.

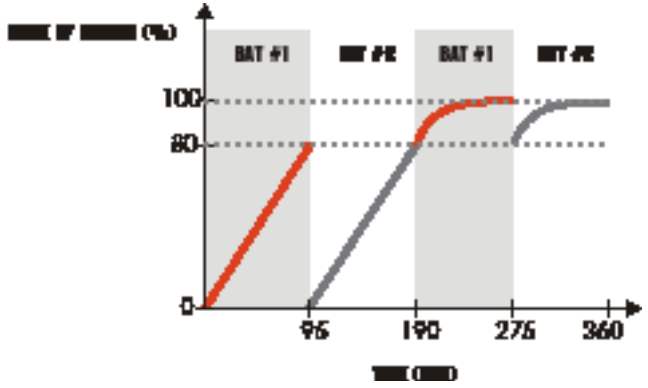
CHARGER PERFORMANCE

The RED CHARGER is designed to support an overnight recharge of two fully discharged RED BRICK 140 batteries (approximately 6 hours) when an appropriate A/C power source is available. When only one battery is inserted, the battery is charged to approximately 80% in about 95 minutes, then is topped to 100% in about 85 minutes.

When two batteries are inserted, the first battery (or the one having the lowest voltage) is charged up to the 80%. After that the second battery is also charged up to the 80%. When both are at the 80%, the first is topped to the 100% and then is the second.

In addition, when connected to an appropriate A/C power source, the RED CHARGER may be used to provide up to 100W of continuous power at 13.8V D.C to a RED ONE Digital Cinema Camera using the supplied 10ft D.C power cable.

RED CHARGER PERFORMANCE			
BATTERY MODEL	2 x Lion V-type Sequential		
	Approximate charging time per channel (min)		
		100%	80%
RED BRICK 140	140Wh	"180	"95



IPCS AND FAST CHARGING

The RED CHARGER features the highest charging current for a Li-Ion charger in the broadcasting sector. This results in currently the shortest possible battery charging time.

RED BRICK Li-Ion battery series allow fast charging due to several intrinsic features such as pre-charge protection and cell balancing; avoiding cell damage and life-cycle shortening, as demonstrated by the life-cycle performances.

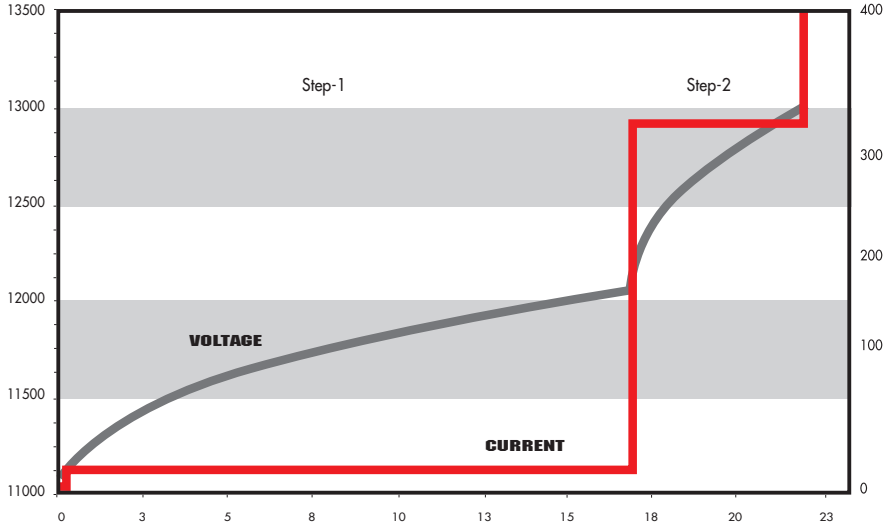
Additionally, the new RED CHARGER supports and enhances these features with IPCS, a 2-step Intelligent Pre-Charge System.

Since fast charging can damage cells if not properly applied, especially with low voltage (discharged) cells, appropriate care must be taken. The 2-step procedure implemented by IPCS, initially boosts very low voltage cells to a state where charge can be applied with a medium-low current without damage, then starts to charge with a 300mA current for a while. Finally, when the pack reaches a reasonable voltage state, it speed-up the charge process by going to full throttle.

The operation implemented by IPCS is only applied if the prevailing cells-state need it, and normally takes a few minutes, depending on the state of discharge of the cells.

The operation implemented by IPCS is outlined in the chart below.

IPCS 2-step Intelligent Pre-charge System



CTP: FLEXIBILITY OF OPERATION AND CHARGER RELIABILITY

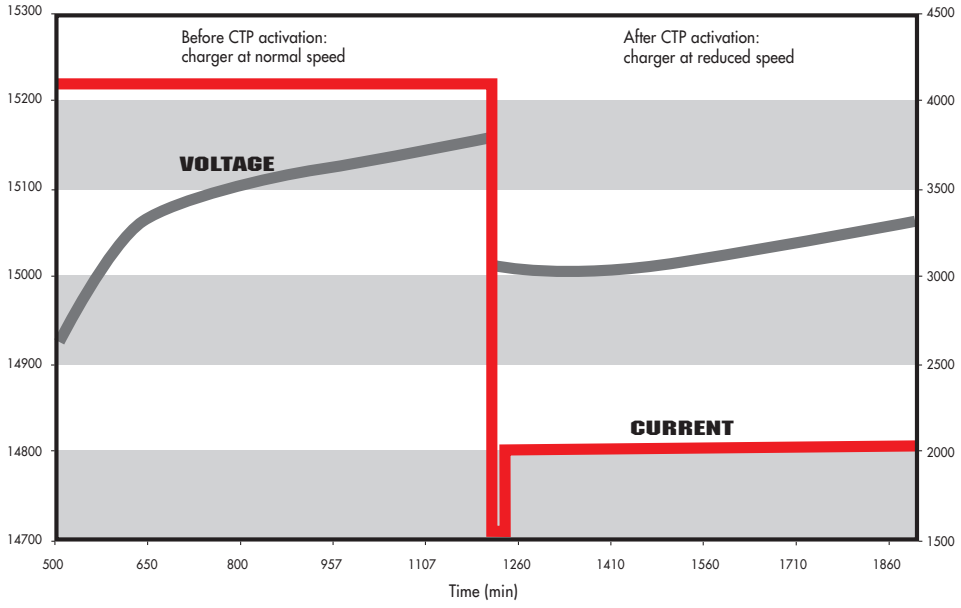
Due to the high charging currents developed by the RED CHARGER, heat control is an issue for a travel charger, especially if the travel charger is used in potentially hot environments.

To improve the reliability of the device without compromising its usage flexibility, RED has developed an innovative feature; CTP (Charger Thermal Protection) that allows the electronics to work out the best possible charge profiles without causing damage, even in adverse temperature conditions.

In case of the charger internal temperature reaching a high level, the charging current is automatically reduced to avoid possible damage caused by internal overheating. When the charging speed is reduced, the internal temperature starts to descend. As soon as the temperature reaches a safe level, normal charging speed is resumed.

Through indoor usage, CTP features do not normally intervene (unless the air convection flow path is obstructed or the internal cooling fan is damaged).

The operation implemented by CTP is outlined in the chart below.



OPERATING INSTRUCTIONS: RED CHARGER

This charger sequentially charges two batteries with charging currents of up to 4.8 Amperes.

- Plug an AC power cord provided into the charger AC input
- Plug and switch on the AC mains supply
- Insert a battery inside any one of the two V-plate adapters
- Observe the LED. In addition, the charge status may be read in 20% steps through the RED BRICK battery LED array (see table on page 5).
- Leave the battery to charge for the appropriate time (see table on page 4)
- Unplug the battery when the LED becomes steady green

IN THE CASE WHEN YOU WANT TO CHARGE 2 BATTERIES:

Insert the second battery into the second V-plate adapter.

The LEDs will always display the correct status of the charging process for each battery.

In the case when an accessory is plugged into the 6 pin LEMO auxliary power output, the charging process will be suspended. The AUX LED will light up and the other battery LEDs will show 'WAITING'.
Once the accessory has been unplugged, the charger will continue the previous charging sequence and from the same point of interruption.

NOTE THAT THE MAXIMUM LOAD THAT CAN BE CONNECTED TO THE LEMO OUTPUT SHOULD NOT EXCEED 100W.

ADDITIONAL SAFETY NOTES

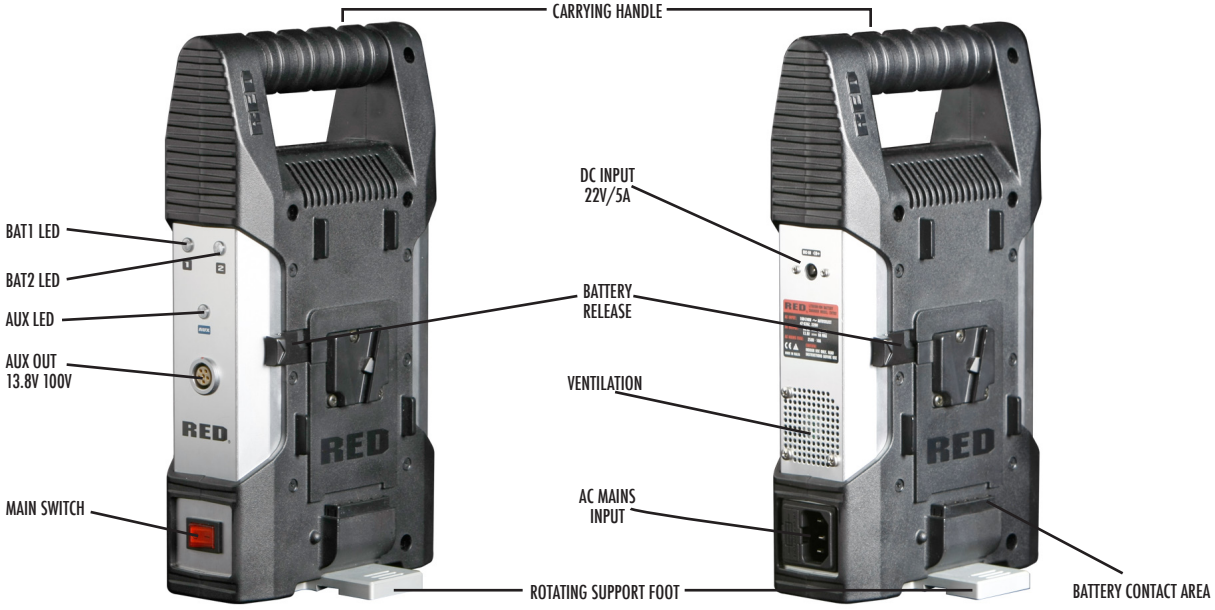
Chargers and/or batteries may become hot during charging. This is normal. Please consult RED if you notice that either a charger or a battery become excessively hot during the charging operation

Be careful not to block the equipment's ventilation outlets
Never insert any metallic or any other objects inside the equipment through the ventilation openings or otherwise.

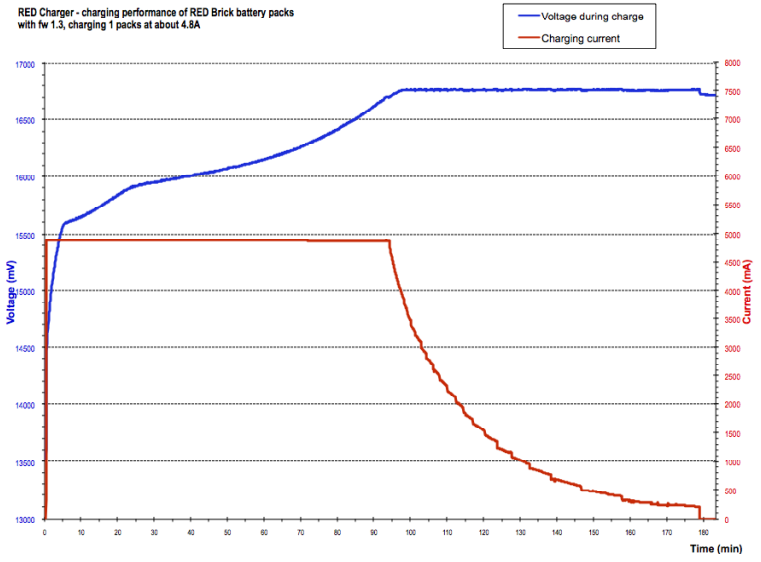
#	OPERATING MODE	TIME OUT	LED INDICATION
1	BATTERY DETECTION Bat1 on charge / Bat2 waiting		**BATTERY WAITING:** GREEN: 1s ON / 1s OFF
2	BATTERY NOT ALLOWED 10Kohm < ID resistor < 60Kohm		**BATTERY NOT ALLOWED:** GREEN: 500ms / RED: 500ms
3	BATTERY EVALUATION i) Total pack voltage < 8000mV ii) I < 10mA If the charging does not rise within 30s, the battery does not accept charge iii) Individual cell voltages < 2800mV 10mA < I < 30mA iv) Individual cell voltages > 2800mV Total pack voltage < 13000mV 30mA < I < 300mA	 3600s 1200s	**VOLTAGE TOO LOW:** RED: 500ms ON / 500ms OFF **BATTERY FAILURE:** Steady RED **PRECHARGE-1:** ORANGE: 500ms ON / 500ms OFF **PRECHARGE-2:** ORANGE: 250ms ON / 250ms OFF
4	CONSTANT CURRENT MODE State of charge: from 0% to 80% 13000mV < V < 16800, I = 4.8A	18000s	**CC-MODE:** Steady ORANGE
5	CONSTANT VOLTAGE MODE State of charge: from 80% to 100% V =16800mV, 120mA < I < 4800mA	10800s	**CV-MODE:** 80% to 95%: ORANGE 500ms / GREEN 500ms 95% to 100%: ORANGE 1sec / GREEN 1 sec
6	FULL CHARGE V = 16800mV I = 120mA		**FULL CHARGE:** Steady GREEN
7	OTHER INDICATIONS In the case of premature charge termination, the charger retries to charge after 30 seconds. If after 30 minutes, there is still no response, the indication is changed into 'BATTERY FAILURE' In the case of a battery temporarily not accepting any charge (i.e. an overheated battery) the charger will retry every minute. In this case the charger flashes red indicating a temporary failure		**PREMATURE CHARGE TERMINATION:** RED: 250ms ON / 100ms OFF / 250ms ON / 1s OFF (2 blinks + 1 pause) **TEMPORARY FAILURE:** RED 500ms ON / 500ms OFF

TECHNICAL SPECIFICATIONS:	
Type	Constant current and voltage control system with timer interventions
CC-MODE: Output current	4800mA +/- 2%
CC-MODE: Vmax	16800 ± 50mV (0.3%)
CV-MODE: Vmax	16800 ± 50mV (0.3%)
CV-MODE: Cutoff current	120mA ± 10mA
Short circuit protection	Available
Overcharge protection	Available
Overtemperature protection	Available
LEDS	3 colour type for BAT1, BAT2 and AUX
Special features	IPCS and CTP
Auxiliary power	13.8V 100W (max)
Power supply	•AC mains 100V ~ 240V, 47 ~ 63 Hz autoselect
Power consumption	220W
Operating temperature range	0°C - 45°C
Storage temperature range	-20°C - 65°C (-4°F - 149°F)
Dimensions	250 x 145 x 80mm
Weight	970g

This charger has been tested for and is fully CE compliant.



The rotating aluminium foot is pulled out and rotated 90° in a left or right hand direction for vertical free standing operation. The unit has been designed to remain in balance with only one battery or with both batteries connected.


RED Charger - charging performance of RED Brick battery packs
with fw 1.3, charging 1 packs at about 4.8A
Voltage during charge
Charging current
Voltage (mV)
Current (mA)
Time (min)

NOTES CONCERNING CHARGER USAGE WITH RED BRICK BATTERY PACKS

It is preferable to charge batteries immediately before use. Some loss from self-discharge can result if the batteries are charged several weeks in advance of their use. However, this slight loss can be topped up at any time without any degradation of battery performance. Batteries should be stored in a cool and dry place. Charging should be performed at temperatures above 5oC and below 45oC. Slight heating of the battery is expected to occur during the charge cycle, however if for some reason, the pack temperature reaches 60oC, charge activity is suspended. The pack resumes normal charging once the temperature drops back to below 50oC. In the case of a battery whose temperature is outside the tolerated range of 5 - 45 ^ deg C, the charger will indefinitely keep retrying every minute, to allow the battery to enter within the correct range.

WARRANTY

High current draw from a RED-BRICK battery pack can heat the internal cells to a temperature at which it is not safe to perform an immediate fast re-charge. Therefore the RED-CHARGER incorporates a cell temperature test for this condition. Specific RED-CHARGER behavior depends on the firmware version.

FIRMWARE PRIOR TO V1.4

When mounted, if the RED-BRICK battery cell temperature is greater than the maximum allowed value, charge operation is suspended and the LED will indicate solid red. Remove the RED-BRICK battery from the RED-CHARGER and allow it to cool for a few minutes. On re-mounting the battery on the RED-CHARGER, if the cell temperature has fallen below the maximum allowed value, the RED-CHARGER will then proceed to charge the RED-BRICK battery.

EFFECTIVE WITH FIRMWARE V1.4

When mounted, if the RED-BRICK battery cell temperature is greater than the maximum allowed value, charge operation is suspended and the LED will flash red (500ms on 500ms off). Leave the RED-BRICK battery mounted. The RED-CHARGER will retest the battery cell temperature at one minute intervals, and when the cell temperature has fallen below the maximum allowed value the RED-CHARGER will then proceed to charge the RED-BRICK battery.

WARRANTY

As a responsible manufacturer, RED Digital Cinema is confident of the quality and workmanship of this RED CHARGER. We guarantee it to be free from defects in material or workmanship for twelve months from date of purchase. In case of claim, please contact RED Digital Cinema at www.RED.com to obtain an RMA number. Instructions will be provided on how to return the defective equipment to RED. Equipment found to be faulty in manufacture will be repaired or, at our option, replaced free of charge. This guarantee does not cover defects caused by incorrect handling, inexpert repair, unsuitable storage, accidental or abnormal conditions of operation, transport damage, tampering, and normal wear. The above guarantee does not affect your statutory rights as a consumer.

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